



2<sup>nd</sup> Annual  
Watershed Snapshot  
April 8, 2006

# Acknowledgements

**Cindy Wallace**  
*South River Federation*

**Paul Sturm**  
*Center for Watershed Protection*



**Sally Hornor, Ph.D.**  
*Anne Arundel Community College*



**Ben Cole**  
**Bill Romano**  
**Sean Smith**  
*MD Dept of Natural Resources*



**Google Earth**

# What is the Snapshot?

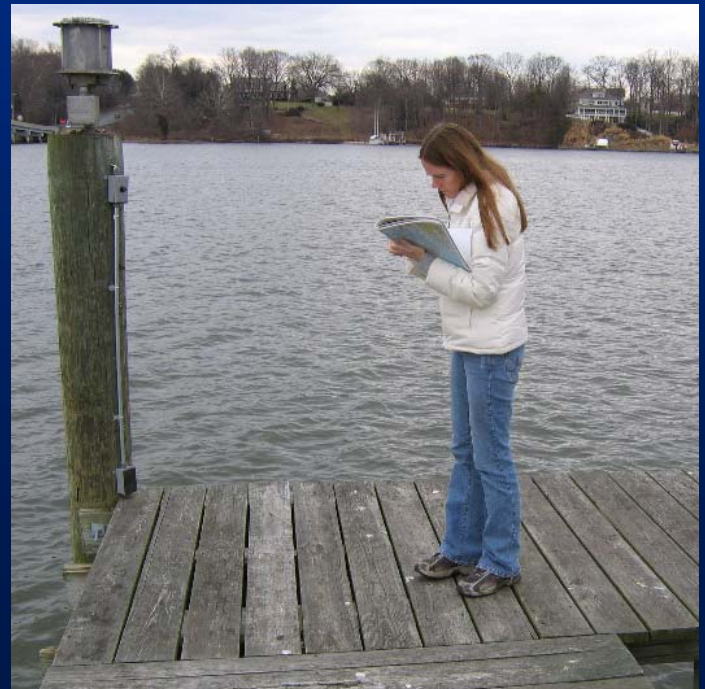
60+ volunteers monitored 45 sites around the watershed

All sites sampled during the same window, 4/8/06 between 9 – 11AM

## Water Quality Test Kit



## Visual Assessment



# New this year...

## Nutrient Testing

- Nitrate
- Phosphate

## More accurate tests

- Dissolved Oxygen
- Turbidity

## Rating System

- Visual Assessment

## More sites!



Fearless  
Snapshot  
Volunteer



# South River Watershed

Bacon Ridge  
Branch

North River

Broad Cr.

Church Cr.

Flat Cr.

Gingerville  
Cr.

Crab Cr.

Beard's Cr.

Aberdeen Cr.

Warehouse Cr.

Almshouse Cr.

Harness Cr.

Glebe Bay

Glebe Cr.

Pocahontas Cr.

Duvall Cr.

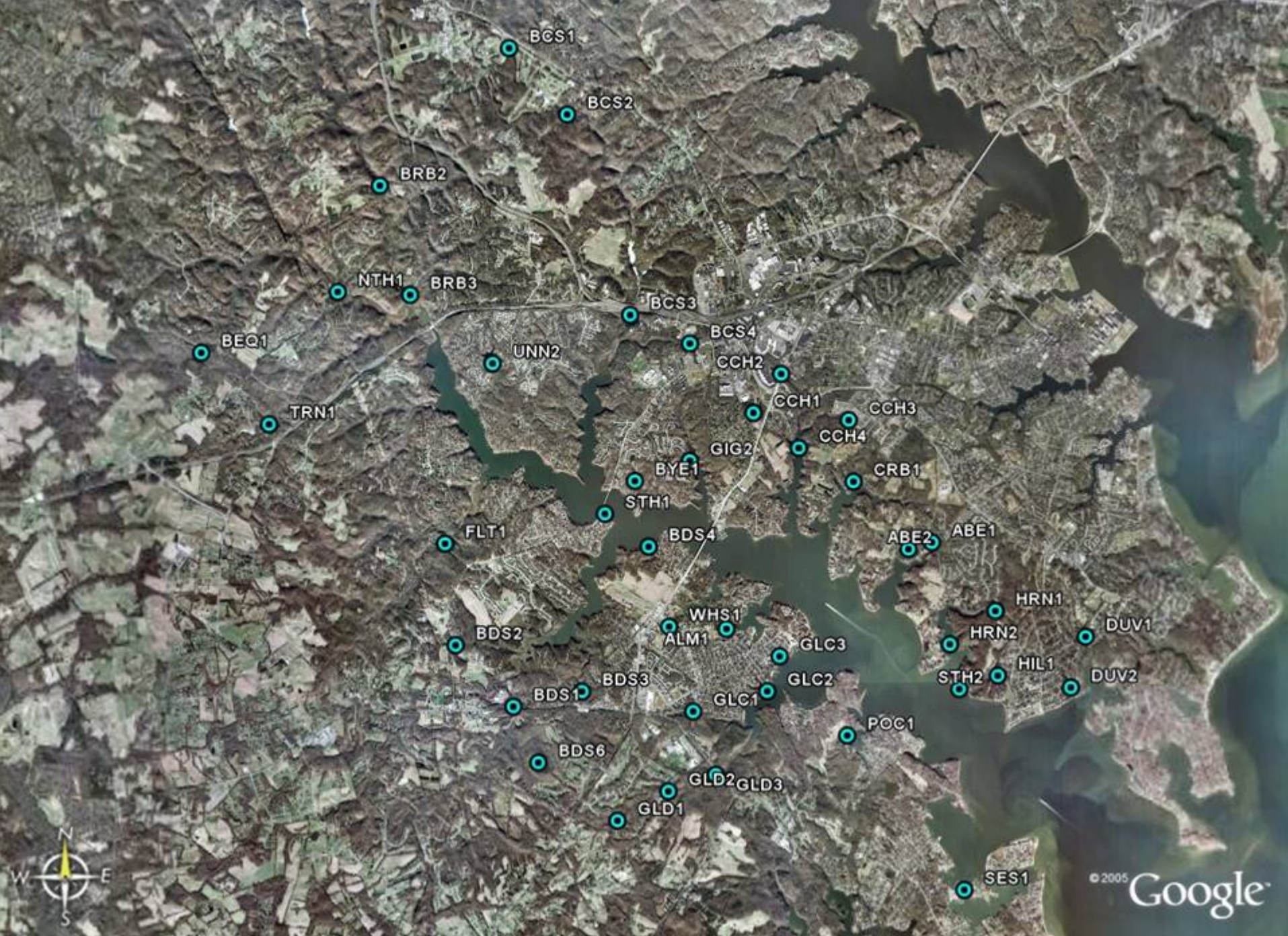
Selby Bay

Image © 2005 DigitalGlobe

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# Bacteria

## Enterococcus

Studies in marine and fresh water studies indicate that enterococci are the most efficient bacterial indicator of water quality. Enterococcus is a bacteria found in the human intestine and therefore a good indicator of human waste.

According to studies conducted by the EPA, enterococci have a greater correlation with swimming-associated gastrointestinal illness in both marine and fresh waters than other bacterial indicator organisms, and are less likely to "die off" in saltwater.

An enterococci result of 104 colony forming units (CFU) per 100 milliliters of water exceeds the EPA single test limit.

For information on the Federation's weekly bacteria sampling, visit:  
[www.southeriverfederation.net](http://www.southeriverfederation.net)



# Bacteria

## The Capital

### Sandy Point bacteria baffles health experts

By PAM WOOD, Staff Writer

There's bacteria in the waters of the Chesapeake Bay at Sandy Point State Park, and no one's sure how it got there.

Investigators have a list of potential culprits - sewage plant problems, leaky septic systems, animal feces, boats dumping waste - but after weeks of investigation, they aren't any closer to finding an answer.

Health and environmental officials have been sampling water, examining sewage pipes and septic tanks and they might even start looking at animal waste in the area in their quest to solve the bacteria mystery.

But scientists warn they might never figure it out.

"We're conducting more tests and we're trying to look at the factors in more detail," said

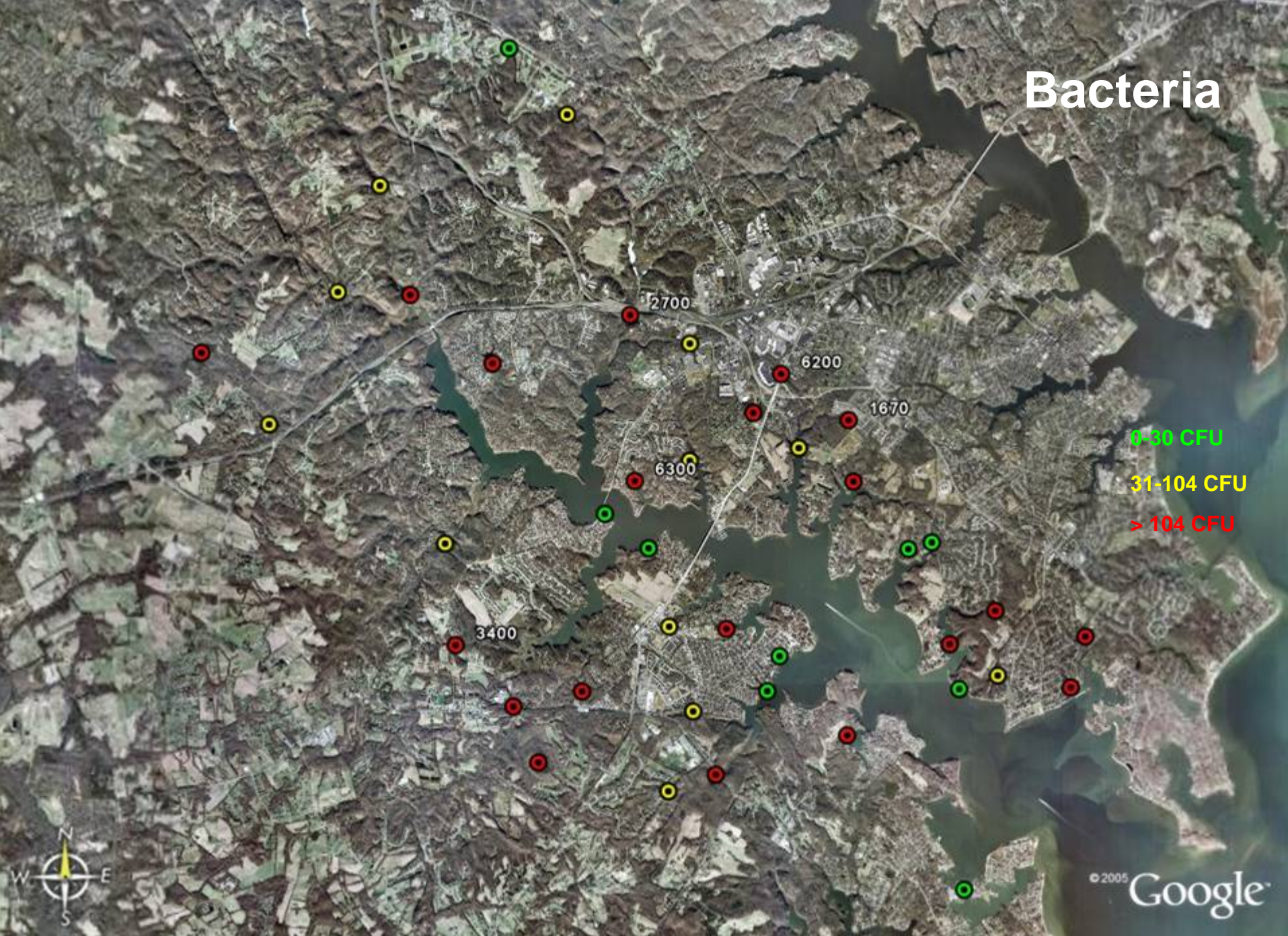
Kerry Topovski, director of environmental health for the county Health Department.

"(But) we just don't know. We may not get the answers that we hope for."

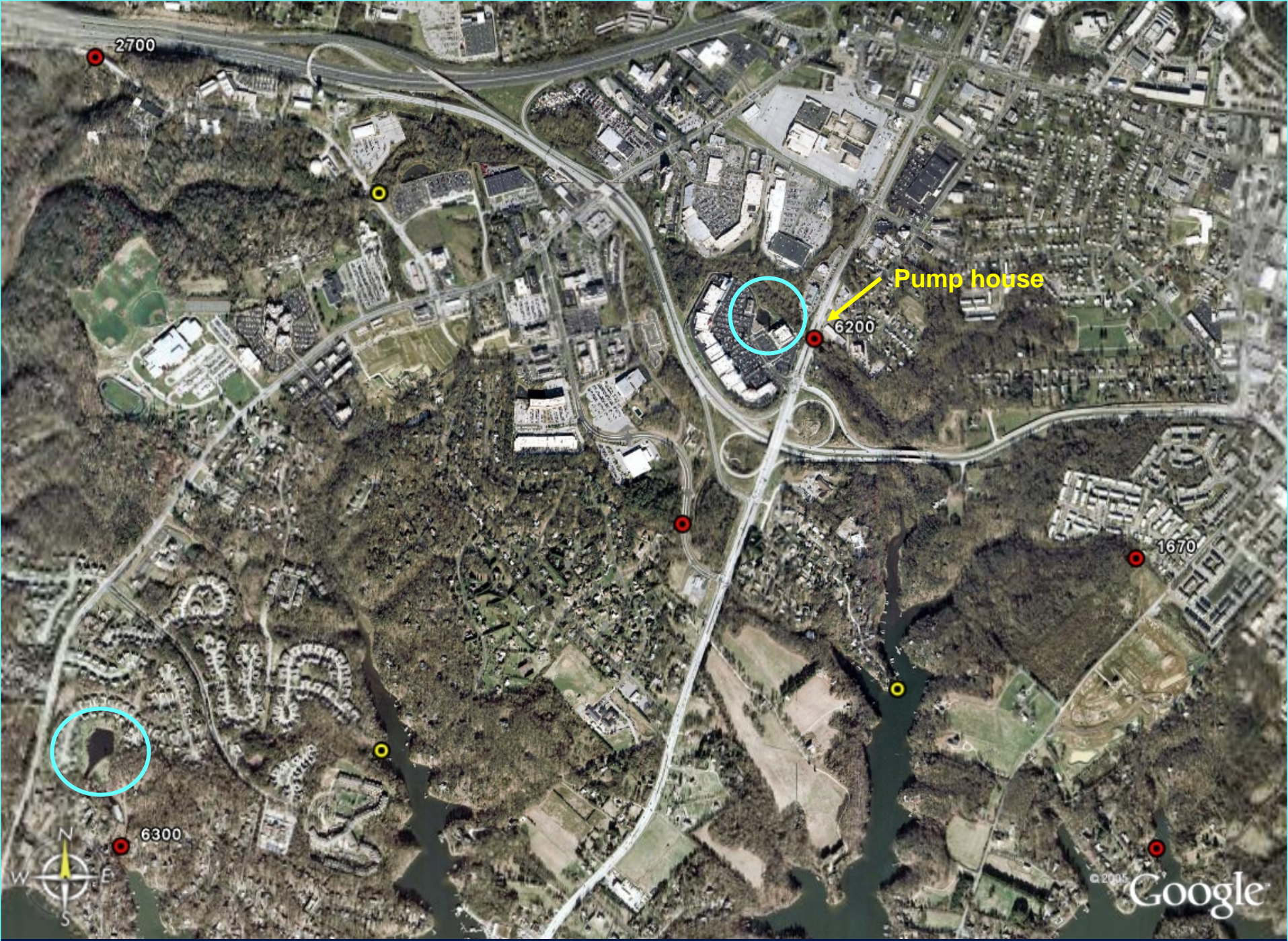




# Bacteria







2700

Pump house

6200

1670

6300

© 2005 Google



# Bacteria

Over half (51%) of bacteria samples tested during the Snapshot were at or above the EPA single test limit of 104 cfu!

South Riverkeeper® Drew Koslow used Snapshot results to focus his weekly bacteria sampling on South River this summer





# Bacteria

Snapshot results  
+  
SRF testing sites

> 104 CFU

SRF testing site in **red**  
had at least one result  
> 104 this summer



# Bacteria

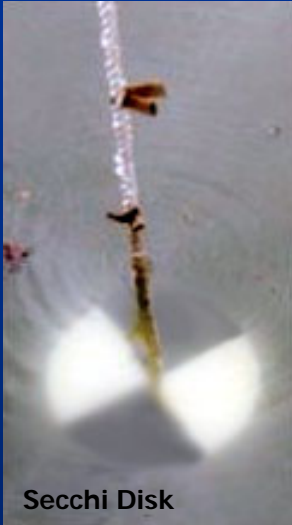
Snapshot results  
+  
SRF testing sites

> 104 CFU

Church Creek



# Turbidity



Water clarity, or **turbidity** of the water, is measured using a circular plate, called a Secchi disk. Turbid waters typically appear cloudy and have high concentrations of total suspended solids, thereby allowing less light to penetrate through the water.

Turbidity can increase due to algal growth, run-off and shore-line erosion, pollution, resuspension of bottom sediments, dredging operations, or during high periods of fresh-water input from rivers and streams.

Highly turbid waters tend to prevent the growth of bay grasses, which provide D.O. to the water column and critical habitat for many fish and invertebrate species.

Turbidity values **over 15 NTUs** are normally considered to be detrimental to bay grass growth. Increased turbidity can also lead to decreased fish health.



# Turbidity (Water Clarity)

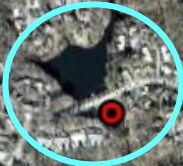
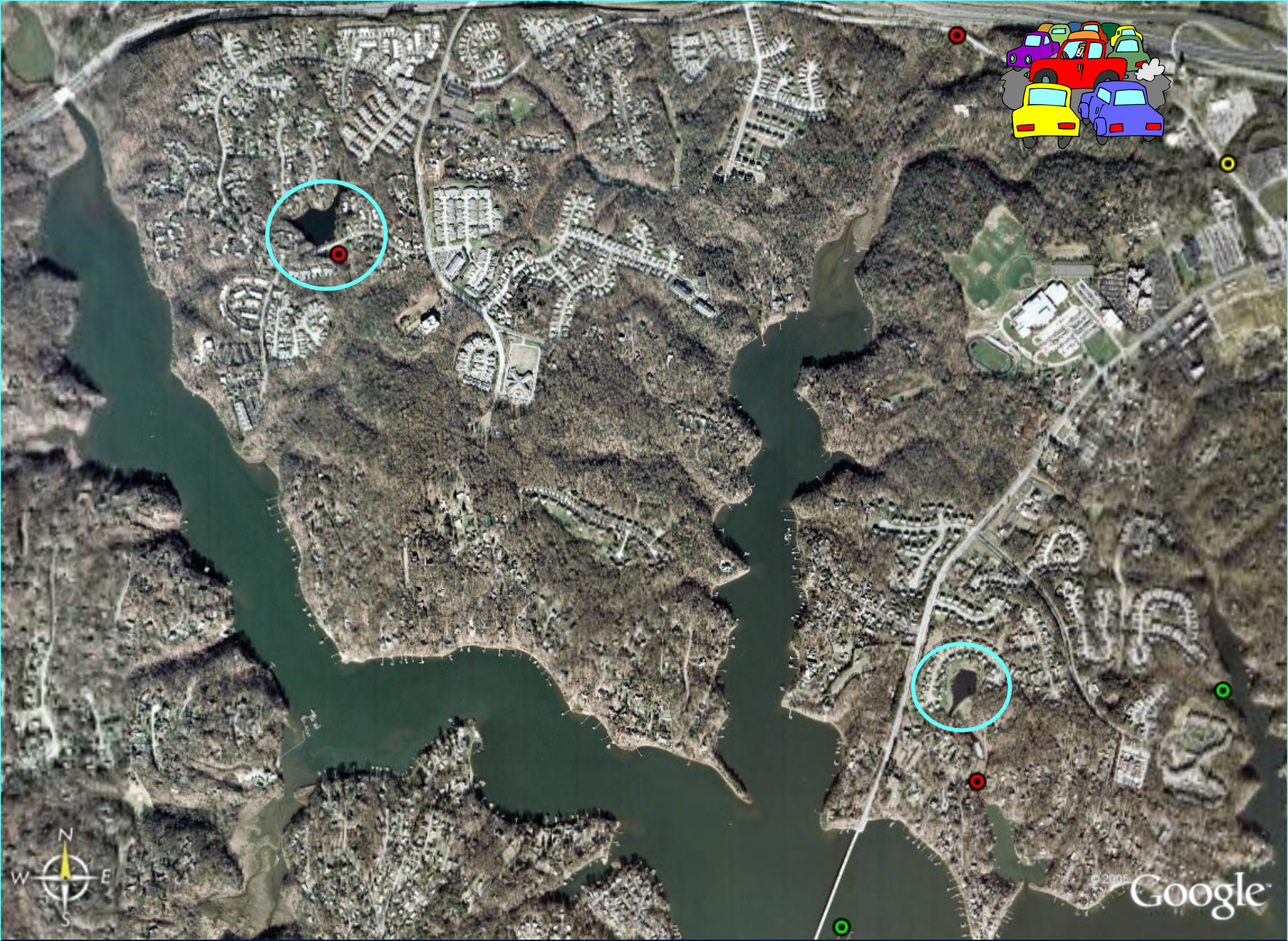
0 - 15 JTU

16 - 44 JTU

52 - 95 JTU



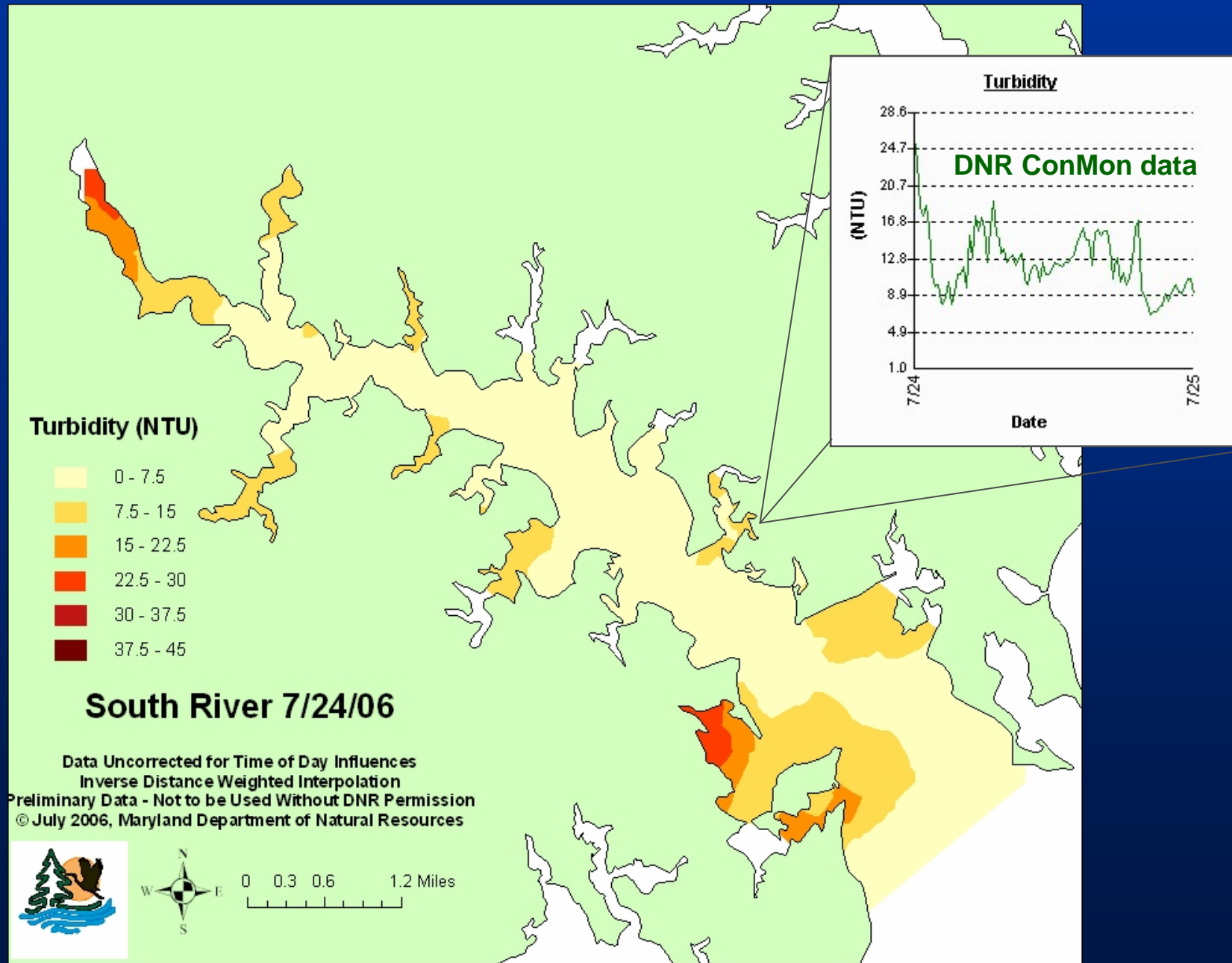




© 2005 Google



# DNR Water Quality Mapping Cruise



# Turbidity

To further explore the high turbidity levels observed in South River, the Federation has been deploying it's own YSI6600 multiparameter water quality datasonde at various locations in the watershed



YSI6600



# 2006 Deployments

Bacon Ridge Br

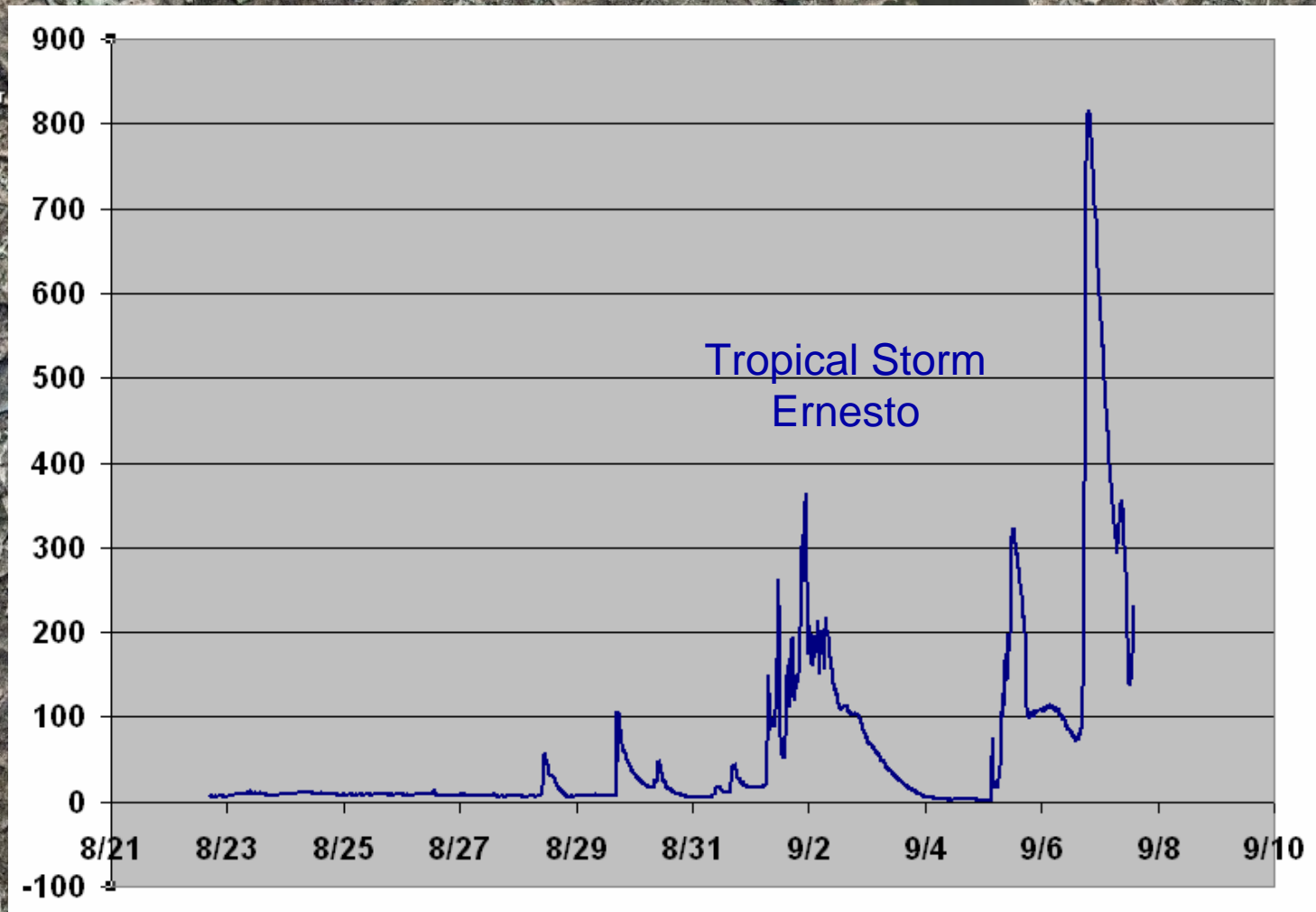
Church Creek 2

Church Creek

Shadow Pt.

Fishing Creek





Fishing Creek



# 2006 Deployments

Bacon Ridge Br

Church Creek 2

Church Creek

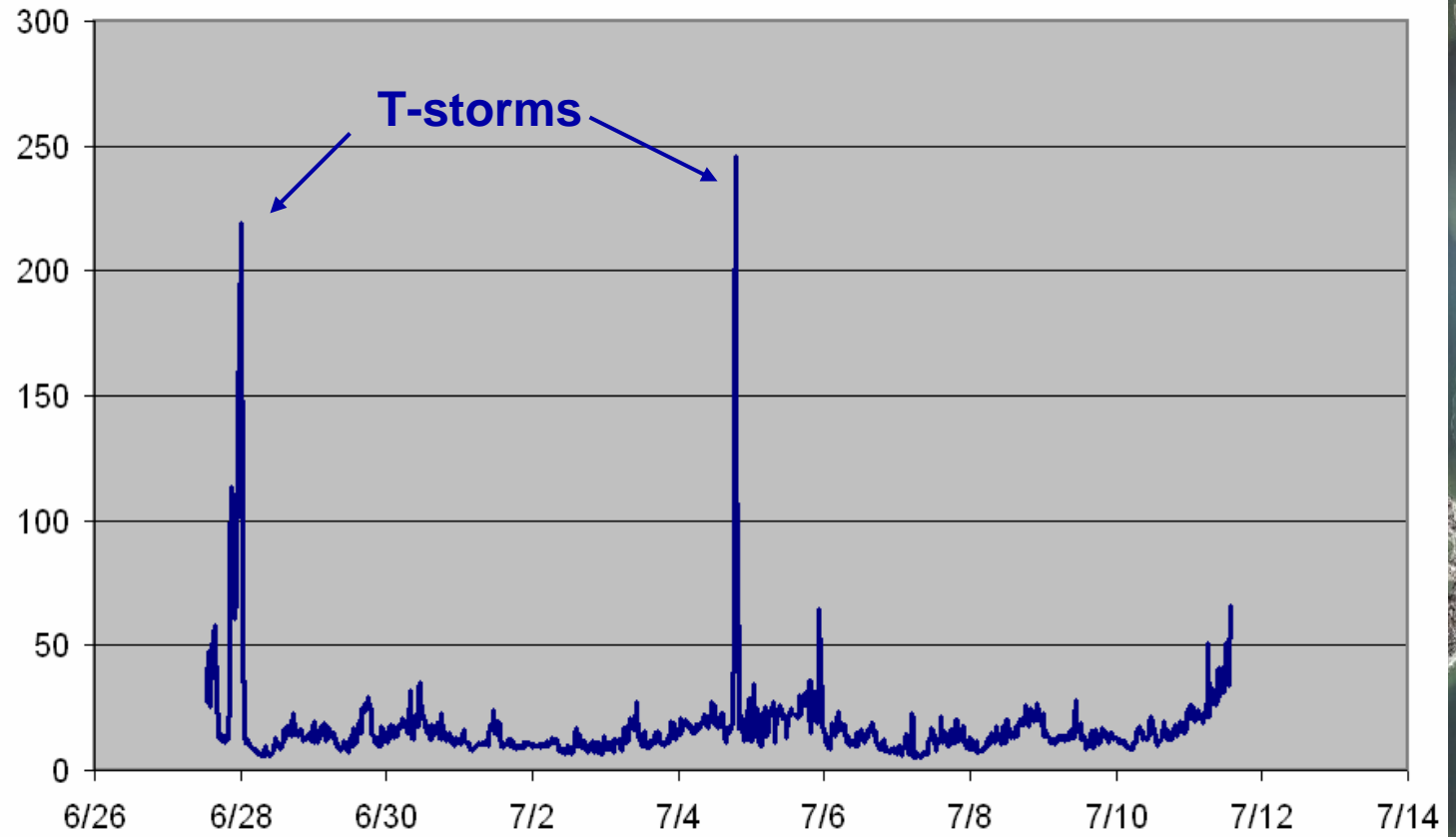
Shadow Pt.

Fishing Creek



## 2006 Deployments

Bacon Ridge Br



# Dissolved Oxygen

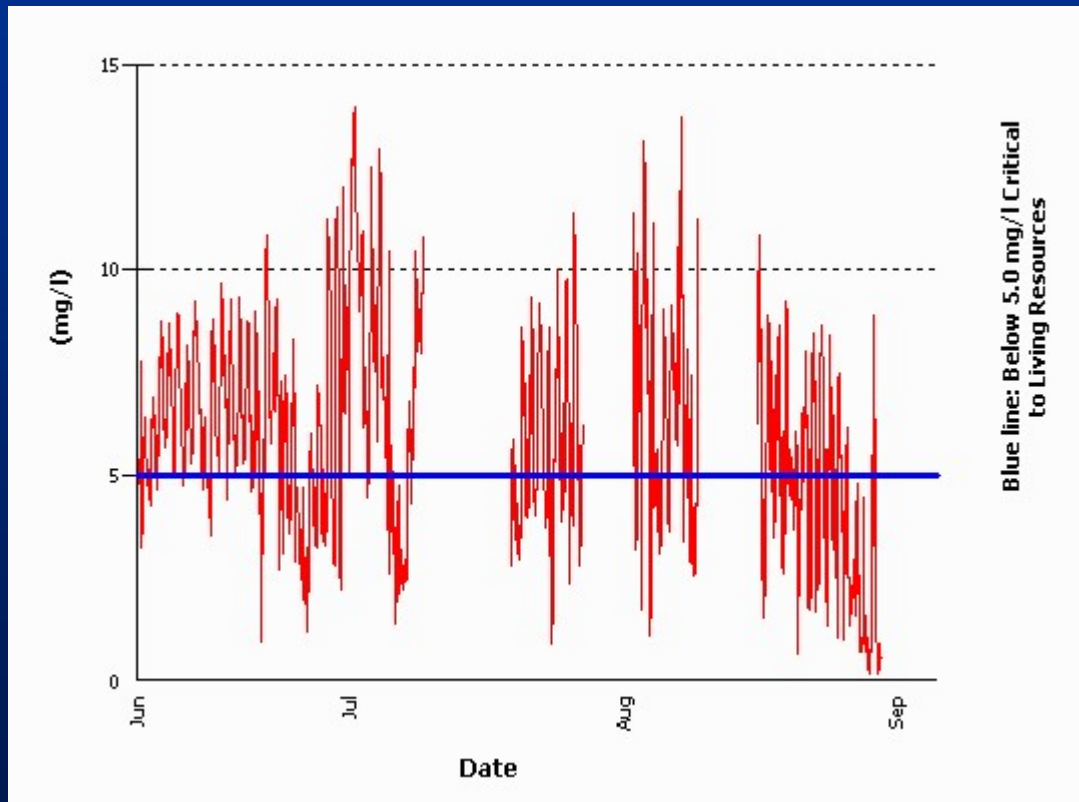
The amount of oxygen dissolved in Bay waters is probably the single most important measure of habitat quality; without oxygen, all of the living resources familiar to us perish.

Dissolved oxygen (DO) is measured as a concentration (mg/l – milligrams per liter). When DO concentrations drop below 5 mg/l, the Bays' more sensitive organisms, such as fish, become stressed, especially if exposed to these conditions for prolonged periods.

Most of the Bays' more visible living resources will not survive exposure to waters of less than 1 mg/l for more than a few hours.

# Dissolved Oxygen

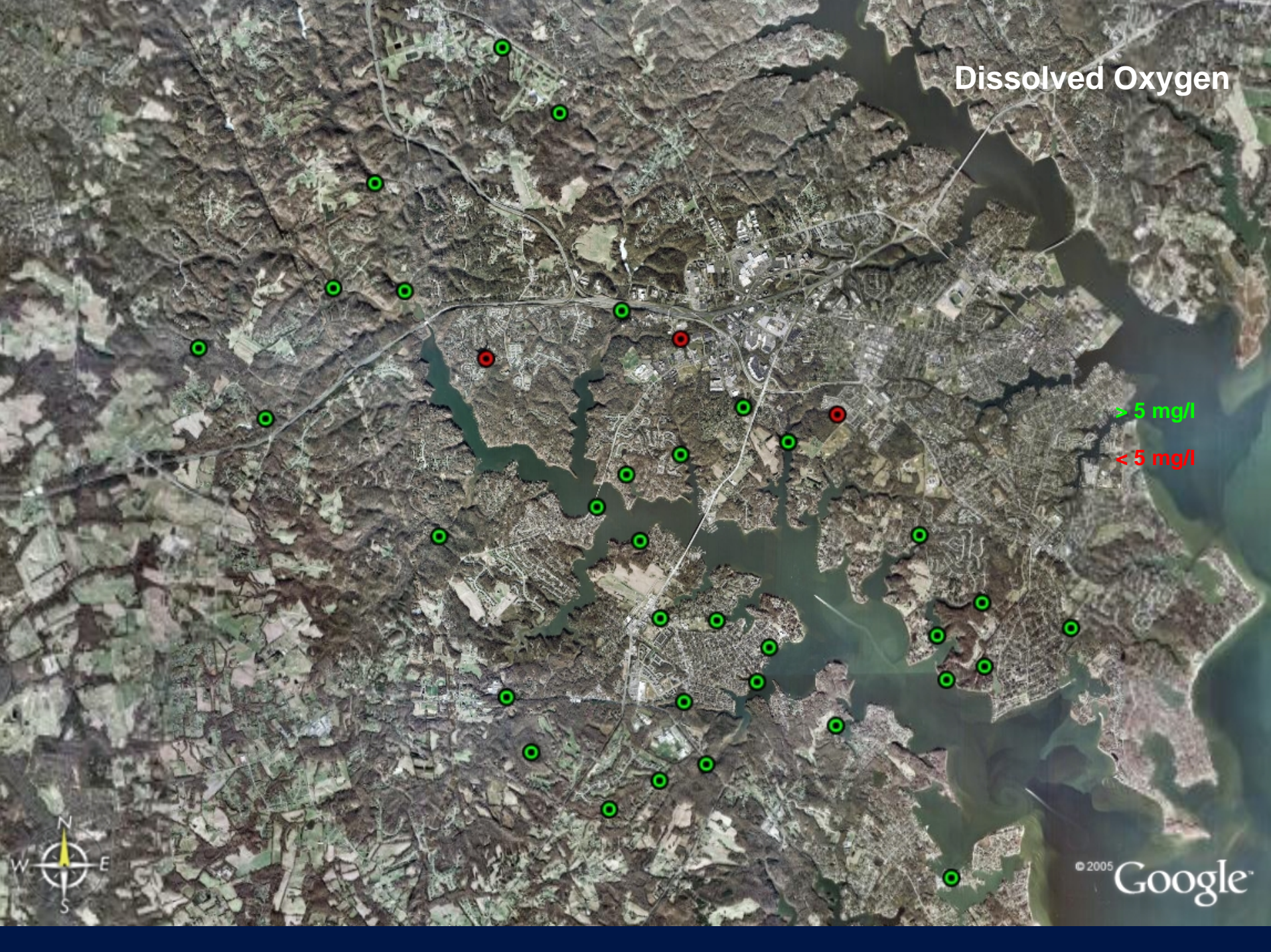
2006 Year to Date  
Dissolved Oxygen Levels  
in Harness Creek



DNR Continuous Monitoring data



# Dissolved Oxygen



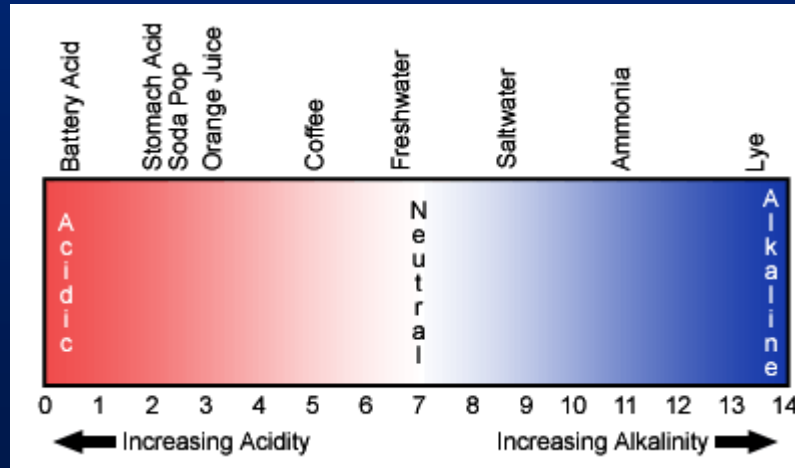


# pH

pH measures the acidity of the water.

A neutral pH is 7; lower numbers indicate higher acidity, while higher numbers indicate more alkaline conditions.

pH can be affected by salinity (higher salinities tend to buffer pH in the 7-8 range) and algal blooms (large algal blooms can raise the pH over 8 in low salinity waters).





pH

< 7

7.0 - 7.5

8.0





# Nutrients

## Nitrate and Phosphate

### **What Are Nutrients?**

Nutrients, like nitrogen and phosphorus, occur naturally in water, soil and air. Just as the nitrogen and phosphorus in fertilizer aids the growth of agricultural crops, both nutrients are vital to the growth of plants within the Bay and rivers.

### **How can nutrients become pollutants to the Bay and its rivers?**

Although nutrients are essential to all plant life within the Bay, an excess of these same nutrients can be harmful. This is called "nutrient pollution".

Nutrients have always existed in the Bay, but not at the present excessive concentrations. When the Bay was surrounded primarily by forest and wetlands, very little nitrogen and phosphorus ran off the land into the water. Most of it was absorbed or held in place by the natural vegetation. Today, much of the forests and wetlands has been replaced by farms, cities, and suburbs. As the use of the land has changed and the watershed's population has grown, the amount of nutrients entering the Bay's water has increased tremendously.

# Nutrients

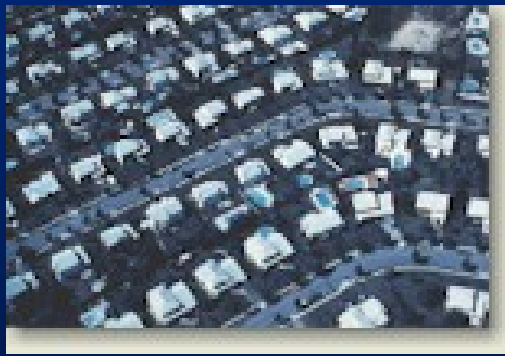
## Nitrate and Phosphate

### What are the Sources of Nutrients?

The main causes of the Bay's poor water quality and aquatic habitat loss are elevated levels of nitrogen and phosphorous. These nutrients occur naturally in soil, animal waste, plant material, and even the atmosphere. In addition to these natural sources, sewage treatment plants, industries, vehicle exhaust, acid rain, and runoff from agricultural, residential and urban areas contribute nutrients to the Chesapeake Bay and its rivers.



Farmland



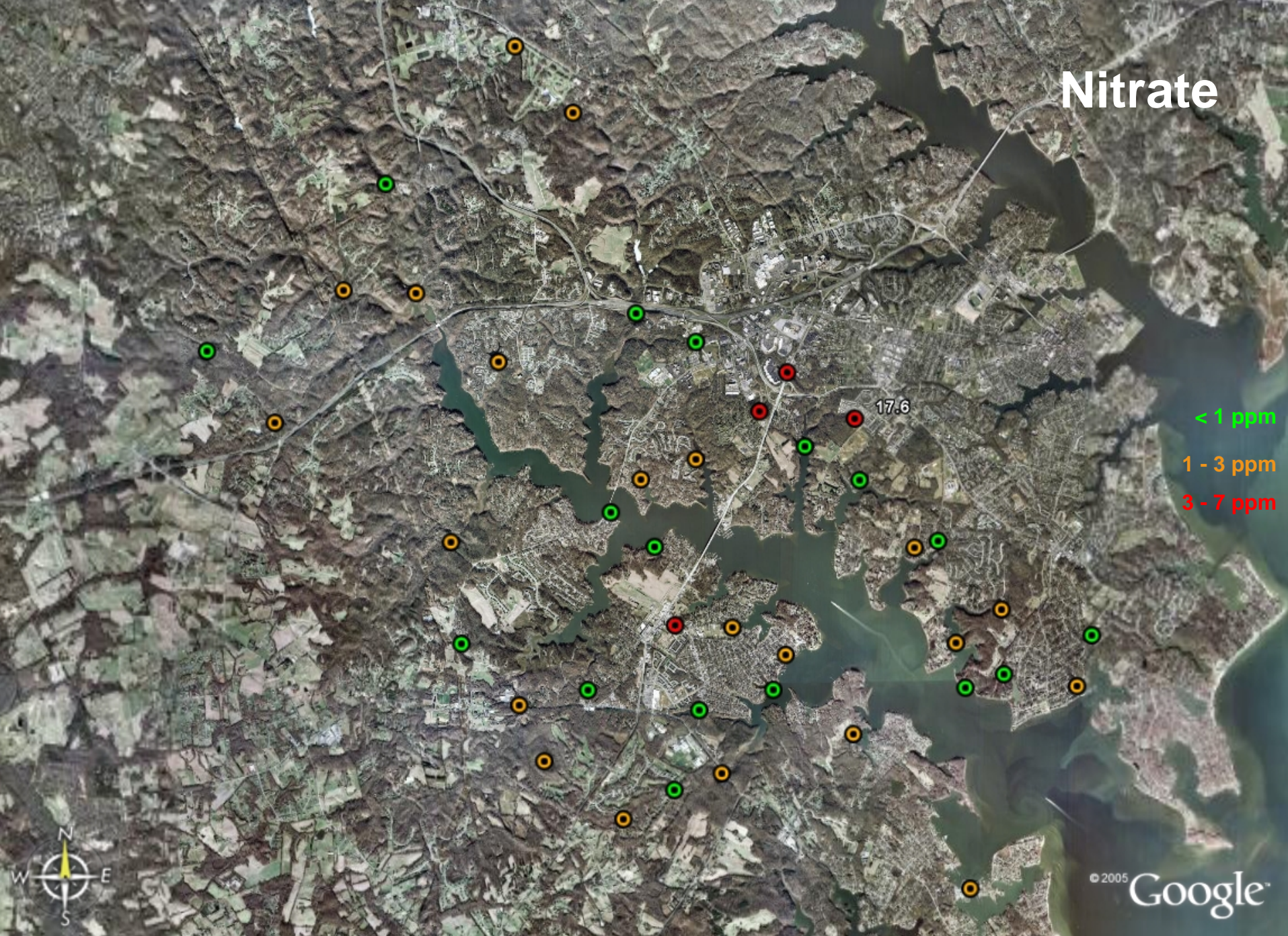
Urban/Suburban



Treatment Plants



# Nitrate





# Phosphate



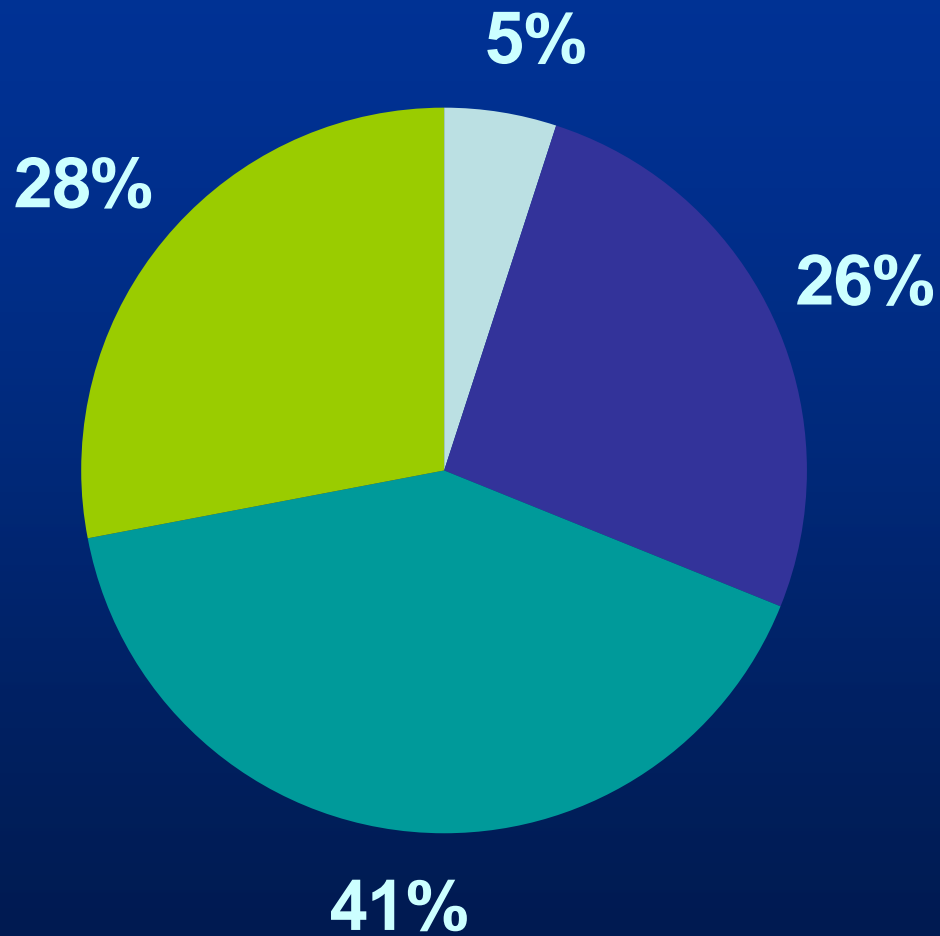


# Litter





# Litter



# Visual Assessment

- Rated 7 parameters on numeric scale to give a total score.
- This score was then divided by total possible points to give a “grade” for each site

90 – 100 A

80 – 89 B

70 – 79 C

60 – 69 D

< 60 F



Good site!



Bad site!



# Visual Assessment

90 – 100 A





# Visual Assessment





# Visual Assessment

90 – 100 A

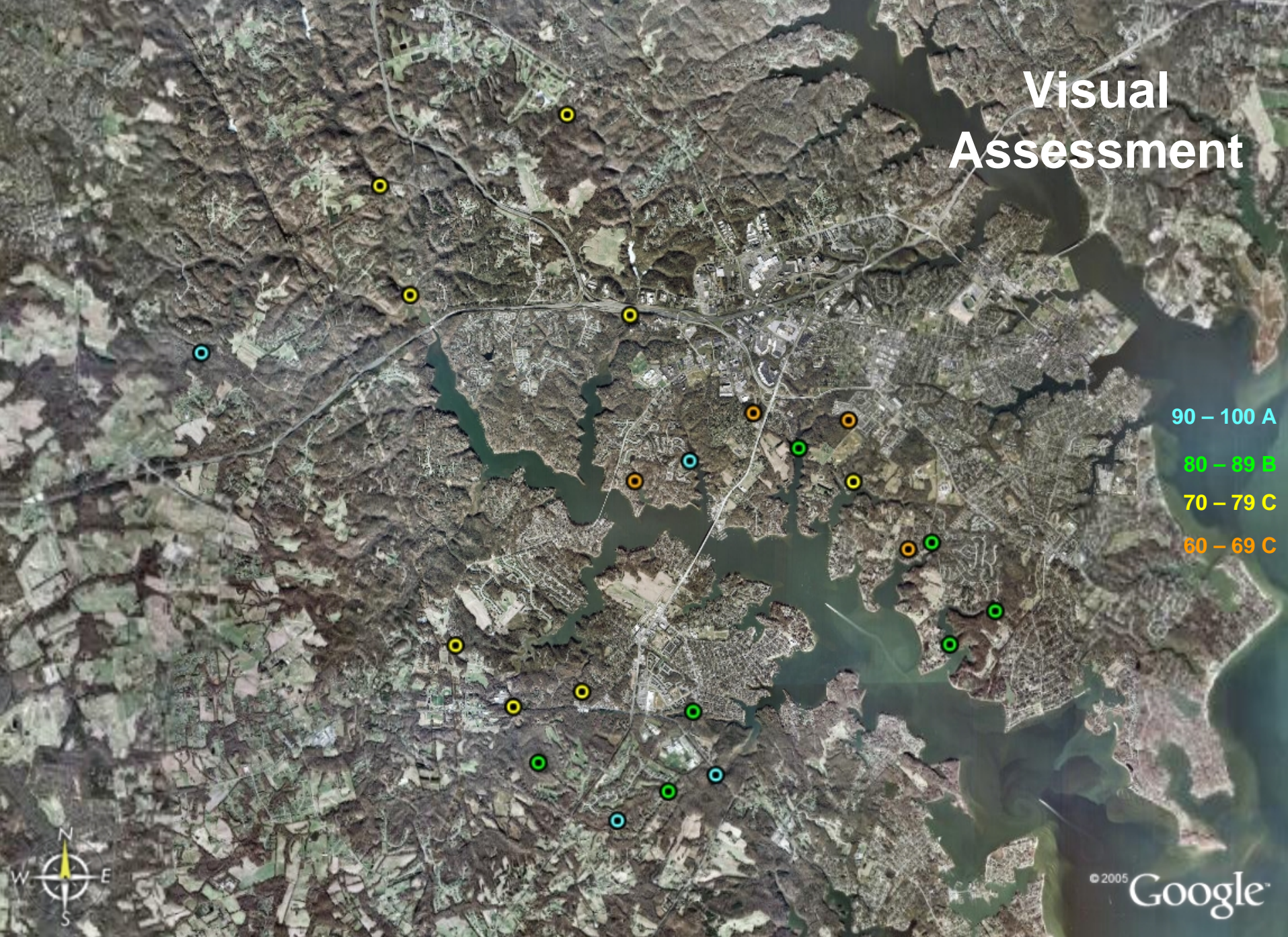
80 – 89 B

70 – 79 C



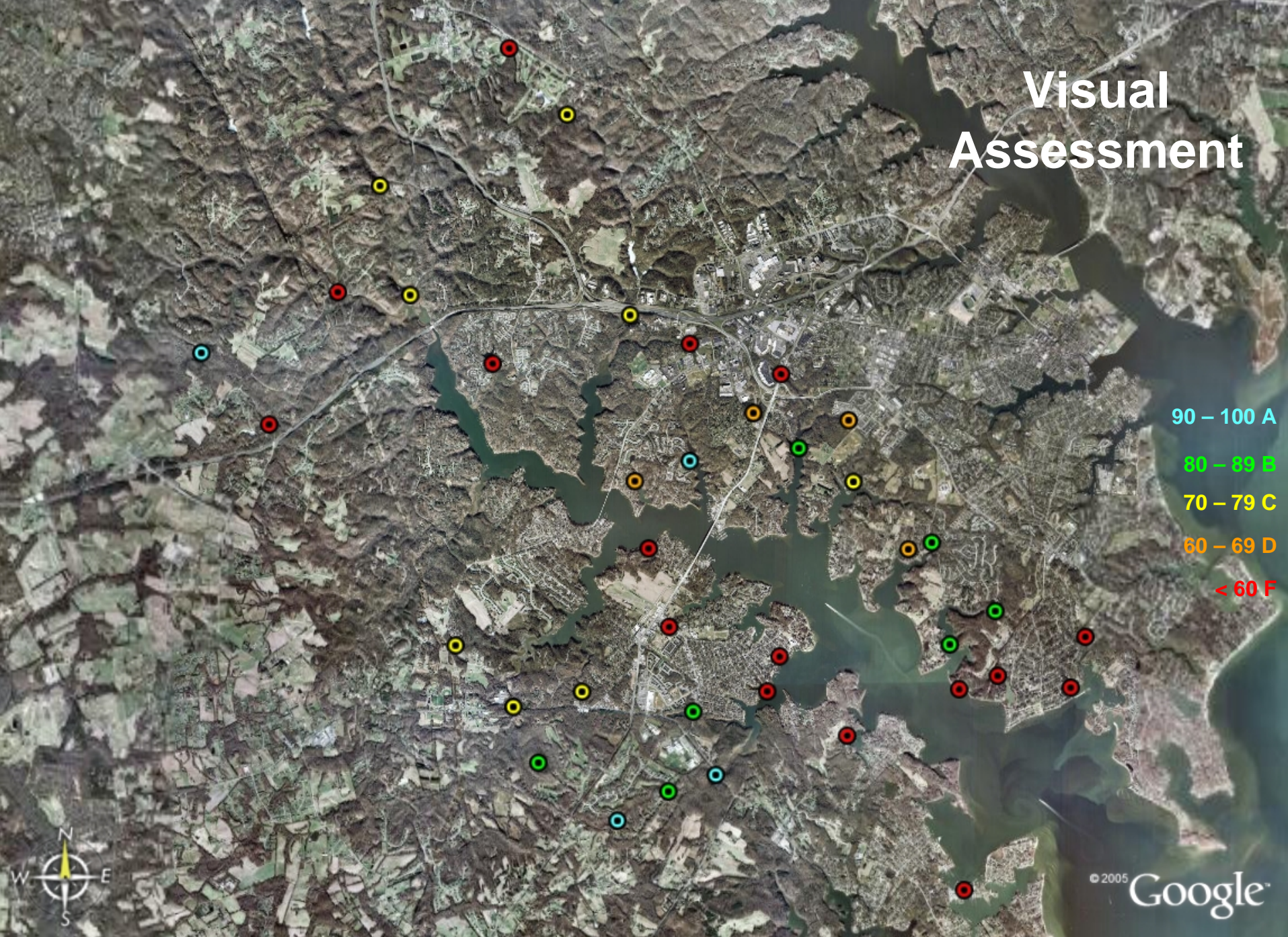


# Visual Assessment





# Visual Assessment





# Biggest Problem?

Construction



Litter / Debris



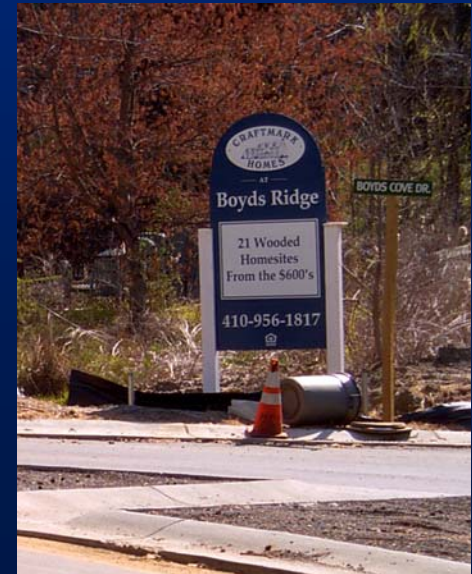
Blockages



Erosion

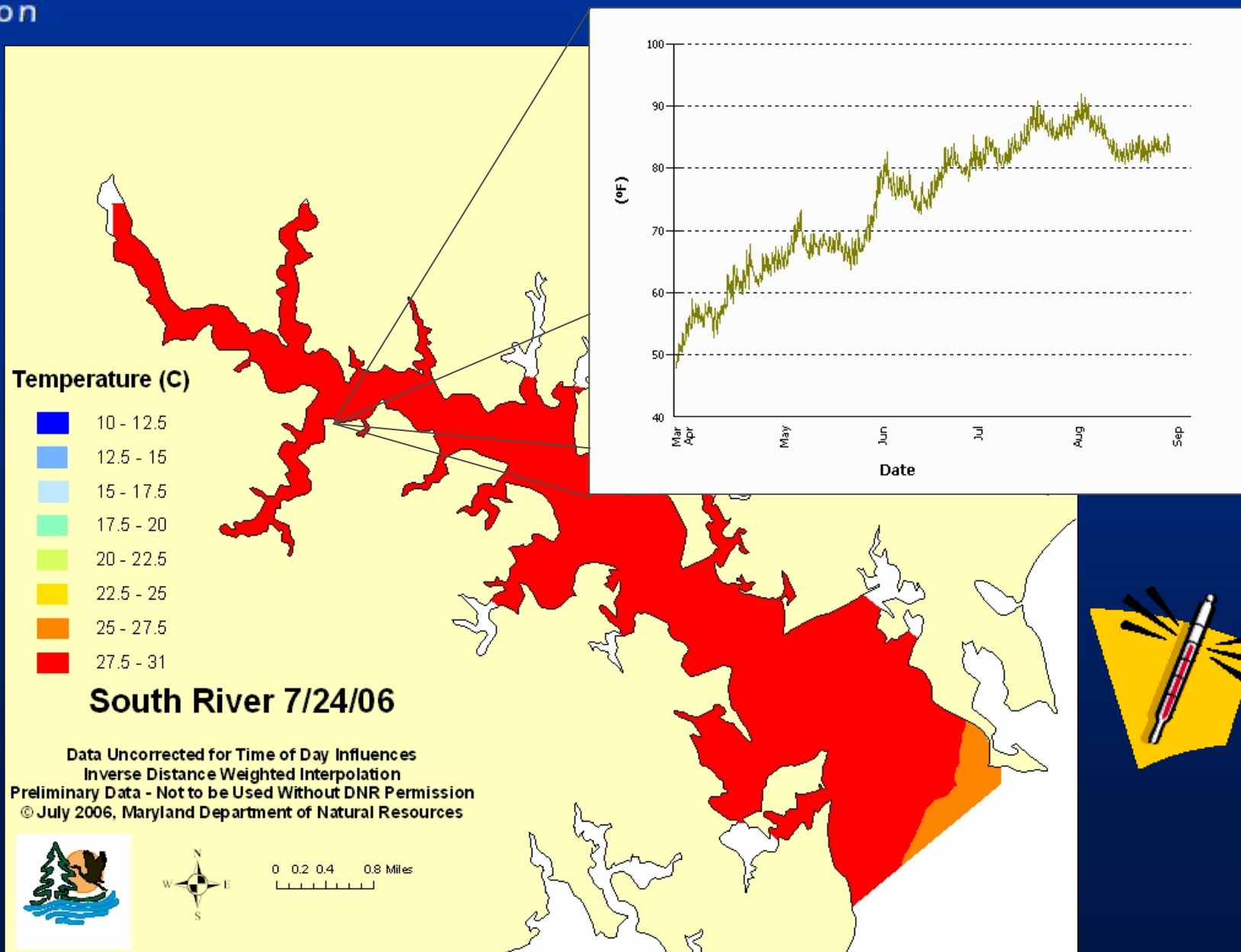


Development





# Temperature





# Temperature

High water temperatures can lead to several detrimental effects on water quality:

Lower dissolved oxygen

Algae blooms

SAV growth may decline due to poor turbidity  
(some species also have a temperature threshold)



# Conclusions

When it rains, a lot of stuff goes into South River!

Nutrient and bacteria input are concentrated in urban/suburban areas.  
May be tied to outfalls from old stormwater ponds or other discharges

High bacteria levels were seen in numerous tributaries to the river  
– this can create unhealthy environment for swimming/recreation

Some “pristine” sites still exist, especially in the contiguous forested area in the headwaters.

We have some great volunteers – Thank You!!!!



## For more info:

DNR Water Quality Monitoring data can be found on:



South River Federation monitoring data can be found at:  
[www.southriverfederation.net](http://www.southriverfederation.net)

Information on Anne Arundel County swimming advisories and bacteria can  
be found at:  
[www.aahealth.org](http://www.aahealth.org)





See you next Spring  
for the  
3<sup>rd</sup> Annual Watershed Snapshot!